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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,477	09/01/1999	Manabu Tomita	TIJ-26105	2630
23494	7590	06/06/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			GUERRERO, MARIA F	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 06/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/387,477	<b>Applicant(s)</b> TOMITA ET AL.	
	<b>Examiner</b> Maria Guerrero	<b>Art Unit</b> 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. This Office Action is in response to the amendment filed March 20, 2005 and the Request for continued examination filed May 17, 2005.

### **Status of Claims**

2. Claims 2 and 8-9 are canceled. Claims 1 and 3-7 are pending.

### ***Continued Examination Under 37 CFR 1.114***

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 17, 2005 has been entered.

### ***Specification***

4. The disclosure is objected to because of the following informalities: the specification as amended in page 3 describes C<sub>4</sub>F<sub>8</sub> as gas with low C/F ratio. Clarification is requested.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al. (U.S. 6,001,699).

Nguyen et al. teaches providing a semiconductor substrate having a lower electrically conducting layer thereon and an electrically insulating layer disposed over the electrically conducting layer (Fig. 2B-2C, Abstract, col. 5, lines 5-20, col. 6, lines 1-45). Nguyen et al. shows providing a gas etchant comprising a mixed gas of two different fluorocarbon gases, each fluorocarbon gas having a different ratio of carbon atoms to fluorine atoms that have different ratios of carbon atoms to fluorine atoms (Abstract, col. 5, lines 64-67). Nguyen et al. discloses the fluorocarbon gas having the higher ratio of carbon atoms to fluorine atoms forming more than half of the mixed gas (3:1) (Abstract, col. 5, lines 64-67, col. 8, lines 1-3). Nguyen et al. teaches etching a connection hole through the electrically insulating layer in a single etching step to the

electrically conducting layer using only the mixed gas as the etchant (Fig. 2B-2C, col. 7, lines 20-40).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1 and 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung (US 6,040,247) (of record) in view of Mizuhara et al. (U.S. 5,898,221).

Chung teaches providing a semiconductor substrate having an electrically insulating layer disposed (Fig. 5a). Chung shows providing a gas etchant comprising a mixed gas of two different fluorocarbon gases, each fluorocarbon gas having a different ratio of carbon atoms to fluorine atoms that have different ratios of carbon atoms to fluorine atoms (col. 4, lines 35-55, col. 5, lines 5-40). Chung discloses the fluorocarbon

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gas having the higher ratio of carbon atoms to fluorine atoms forming more than one half of the mixed gas (col. 5, lines 35-40). Chung teaches plasma-etching a connection hole through the electrically insulating layer in a single etching step and using only the mixed gas as the etchant (Fig. 5b, col. 3, lines 33-37, col. 4, lines 35-55, col. 5, lines 15-40). Chen et al. also describes the use of C<sub>4</sub>F<sub>8</sub> as well known in the art (col. 3, lines 65-67).

Chung does not specifically describe the semiconductor substrate having a lower electrically conducting layer thereon and an electrically insulating layer disposed over the electrically conducting layer as part of the embodiments. However, Chung teaches providing a semiconductor substrate having a lower electrically conducting layer thereon and an electrically insulating layer disposed over the electrically conducting layer as conventional in the art (Fig. 4a-4b).

Chung does not specifically show the upper electrically conducting layer (electrode or wiring) connected to the lower electrically conducting layer. Chung does not specifically show the lower conducting layer having a titanium nitride layer, a layer of aluminum, a titanium layer and a titanium nitride layer stacked in that order. Chung does not specifically show the electrically insulating having the silicon oxide layer formed from TEOS, the spin-on glass layer, and the silicon oxide formed from TEOS stacked in that order. However, Mizuhara et al. shows the upper electrically conducting layer (electrode or wiring) connected to the lower electrically conducting layer (Fig. 9, col. 5, lines 5-9). Mizuhara et al. teaches the lower conducting layer having a titanium nitride layer, a layer of aluminum, a titanium layer and a titanium nitride layer stacked in that order (Fig.

3, 8-9, col. 3, lines 37-40). Mizuhara et al. discloses the electrically insulating having the silicon oxide layer formed from TEOS, the spin-on glass layer, and the silicon oxide formed from TEOS stacked in that order (Fig. 7-8, col. 4, lines 25-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chung reference by including the specific configuration suggested by Mizuhara et al. in order to provide a multiplayer wiring structure having low pollution, low damage and improved reliability with a simplify process (Mizuhara et al., col. 1, lines 5-12; Chung, col. 3, lines 25-37).

In addition, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the concentration merely by following the teachings of the reference. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003) ("The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); In re aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955) ("Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.").

***Response to Arguments***

7. Applicant's arguments with respect to claims 1 and 3-7 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

May 27, 2005

*Maria Guerrero*  
**MARIA F. GUERRERO**  
**PRIMARY EXAMINER**